REMARKS

Claims 1-21 are currently pending in the application, with claims 4-21 having been withdrawn from consideration as being drawn to non-elected inventions or species, there being no allowable generic or linking claim. By this amendment, claims 1-3 are amended for the Examiner's consideration. The foregoing separate sheets marked as "Listing of Claims" shows all the claims in the application, with an indication of the current status of each .

The Examiner's acceptance of the drawings is acknowledged with appreciation.

The Examiner has objected to the title as not being descriptive, and has suggested a title. However, the proposed title simply confirms the Examiner's assessment of the invention as being based upon mere composition of the lower layer, and thereby being anticipated by the prior art. Since this does not accurately describe the invention, the suggested title is not appropriate. The applicant requests reconsideration of the amended title submitted in response to the prior office action, which clarified the importance to the invention of smoothing the barrier layer by smoothing the layers below, whose roughness is inherited by the barrier layer. It should be noted that the title proposed by the applicant is consistent with the possibility, acknowledged by the Examiner in the restriction requirement issued on 07/14/2004, that if a generic claim is finally held to be allowable the additional species II through VIII may then be claimed.

The Examiner has objected to the disclosure because of the use of the term "said lower shield" in line 2 in each of claims 2 and 3, and suggests "said lower shield layer" in order to more clearly refer back to the "lower shield layer" used in line 3 of independent claim 1. This amendment overcomes this objection by appropriate amendments to claims 2 and 3.

The Examiner has rejected claim 3 under 35 U.S.C. §112, second paragraph, as being indefinite because the language of claim is mis-descriptive of the disclosure. In particular, claim 3 reads as follows:

> 3. (currently amended) A magnetoresistive effect sensor according to claim 1 or claim 2, *wherein said lower shield layer is made of a material of CoZrTa, with a CoZrTaCr alloy serving as a base layer for said free layer.* (emphasis supplied)

The supporting language in the specification (at page 24, lines 5-7) is as follows:

> "In particular, it is preferable that the lower shield be made of a material based on CoZrTa and CoZrTaCr alloy."

Thus it is clear that the lower shield is made of "CoZrTa and CoZrTaCr alloy". Claim 3 has been amended to clarify this point.

The Examiner has rejected claim 1 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,898,548 to Dill et al. ("Dill"). This rejection is respectfully traversed for the reasons that follow. Dill discloses an MR read head having sense leads sufficiently thin to achieve high areal density by reducing the spacing between the magnetic shields. A magnetic tunnel junction device is located between two spaced-apart magnetic shields, which also function as electrical leads for connection of the head to sense circuitry. By contrast, the present invention provides a technology of magnetoresistive sensors for making the surface roughness of the barrier layer small (page 7, lines 19-21), primarily by forming a layer below the barrier layer as smooth and flat as possible (page 10, lines 4-7) and by limiting the crystal grain diameter in that layer and any intervening layers (page 10, lines 13-15). The technical explanation for the adverse affect of surface roughness of the barrier layer on the operation of the magnetoresistive sensor is described with reference to Fig. 2 at page 5, line 13, to page 6, line 17.

There is no recognition in Dill of the significance of surface roughness of the barrier layer, nor disclosure of technology beyond the prior art for reducing this surface roughness by smoothing the layers below. Thus, Dill fails to anticipate the

present invention, as reflected in claim 1 as amended. The Examiner argues that a) the inheritance of roughness by the barrier layer from the lower layers is inherent, and b) Dill discloses use of an amorphous material for the lower shield layer (i.e. CoZrNb). The essence of the Examiner's argument is that the attributes claimed by the applicant are inherent in Dill, notwithstanding failure of Dill a) to recognize the significance of surface roughness of the barrier layer or b) to disclose technology beyond the prior art for reducing this surface roughness of the barrier layer by smoothing the layers below.

The language at issue in claim 1 is as follows:

> ... said barrier layer inheriting a roughness of said lower shield layer ... *wherein either an amorphous material or a microcrystalline material is used in said lower shield layer so as to smooth said lower shield layer, thereby increasing the smoothness of said barrier layer* (emphasis supplied)

It should be observed that the language "an amorphous material or a microcrystalline material" is qualified by the language "so as to smooth said lower shield layer". The claim is written as a limitation to certain materials which operate so as to smooth the lower shield layer, whereas Dill only discloses a different group of materials. **There is no disclosure in Dill of how to distinguish *those members of the disclosed group which are operable for the claimed invention***. As the Examiner observes, the operability of any particular member of the claimed group (i.e. amorphous or microcrystalline) is, in a sense, "inherent" because each member of the group has the desired characteristic. However, the selection and limitation of the claimed group is not in itself "inherent." Indeed, the group disclosed by Dill is defined by the attributes "electrically conducting and of suitably high magnetic permeability" (col. 8, lines 41-42), which has no connection at all – either by way of disclosure or suggestion – to the claimed categories of the present invention. Thus, the a) mere observation by the Examiner that a member of the group disclosed by Dill is also a member of one of these categories, b) where the group disclosed by Dill includes materials not in these categories, c) where the distinguishing characteristics of the

claimed group (i.e. amorphous or microcrystalline material) is not also disclosed, d) and where the distinguishing characteristics of the group disclosed by Dill (i.e. electrically conducting, high magnetic permeability) is different from the distinguishing characteristics of the claimed group, e) cannot serve as a disclosure of what is claimed. In short, Dill does not disclose what is claimed with the requisite particularity.

The Examiner's argument would have the necessary particularity if the group of materials disclosed by Dill were all within the claimed group. If that were the case, then the "inherency" argument would make sense, because each member of the disclosed group would have the distinguishing attribute. Then the issue would be whether the claim could be amended to exclude the materials in the Dill disclosure. However, that is not the case. The group of materials disclosed in Dill includes members which do not have the claimed attributes, which is not surprising since the group of materials disclosed in Dill is defined by electrical/magnetic attributes whereas the claimed group is defined by chemical/structural attributes. Therefore, the "inherency" argument is incorrect as to the group of materials disclosed in Dill. The selective application of the "inherency" argument to convenient members of the group disclosed by Dill is simply an improper hindsight argument in disguise.

The Examiner has also rejected claims 1 and 3 under 35 U.S.C. §102(a) as being anticipated by U.S. Patent No. 6,452,204 to Ishiwata et al. ("Ishiwata"). This rejection is also respectfully traversed, for the reasons that follow and – with respect to the "inherency" arguments raised by the Examiner – for the reasons given in the foregoing discussion regarding the Dill reference. Ishiwata discloses a tunneling magnetoresistance (TMR) transducer capable of suppressing the thermal asperity problem, i.e. the increase in temperature of the GMR head where the gap between the GMR head and a magnetic medium is less than about 40 nm. Ishiwata provides a TMR transducer where the resistance of the barrier layer remains essentially constant independent of the temperature of the transducer. This is achieved by adjusting the

pressure of oxygen (col. 4, lines 44-45; col. 7, lines 65-66) or nitrogen (col. 6, lines 14-15) and the substrate temperature. While Ishiwata indicates that the thermal asperity problem may be avoided by specially smoothing the surface of the magnetic medium (col. 1, lines 50-52), and that a prior art TMR produced by growing alumina on an aluminum layer by an oxygen glow discharging process (col. 2, lines 1-2) makes control of the thickness of the tunnel barrier layer difficult (col. 2, lines 18-19), there is no disclosure of either the significance of roughness of layers underlaying the barrier layer or technology for controlling and reducing this roughness.

Consequently, Ishiwata fails to anticipate the present invention, as reflected in the claims as amended. For the reasons stated above with respect to the Dill reference, the Examiner's "inherency" argument fails because Ishiwata fails to disclose what is claimed, namely, not simply that the roughness of the lower shield layer is inherited by the barrier layer, or that a particular material is usable in the lower shield, but also that there is a connection between the material used and the smoothness of the lower shield.

The Examiner has rejected claims 1-2 under 35 U.S.C. §102(a) as being anticipated by U.S. Patent No. 6,490,139 to Hayashi et al. ("Hayashi '139"). Hayashi provides a magneto-resistive element where the average surface roughness of the first electrode is less than 0.3 nm, sufficiently small that the non-magnetic layer formed on the first electrode is "flattened," thereby preventing leakage current. By contrast, the present invention is concerned not with preventing leakage current but rather with reductions in the effective thickness of the barrier layer and consequent reductions in the change in resistence corresponding to the sensing current.

It will be observed that because the inventor of the present invention is one of the inventors of the Hayashi '139 prior art, the reference may be overcome by a declaration from Mr. Hayashi showing that either he was the inventor of the relevant art disclosed in the reference or the present invention was invented by him prior to the filing date of the reference. As the attached Article 132 Declaration makes clear, Mr.

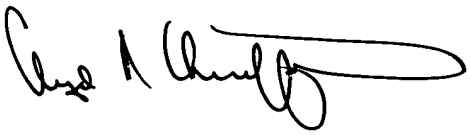
Hayashi is the sole inventor of the relevant art disclosed in the Hayashi '139 prior art. Consequently, the relevant disclosures of Hayashi '139 do not disclose an invention "by another." It is therefore submitted that the §102(e) rejection is overcome as to the Hayashi '139 reference, whether or not this reference would otherwise be a valid §102 reference.

In view of the foregoing, it is requested that the application be reconsidered, that claims 1-3 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at 703-787-9400 (fax: 703-787-7557; email: clyde@wcc-ip.com) to discuss any other changes deemed necessary in a telephonic or personal interview.

If an extension of time is required for this response to be considered as being timely filed, a conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,



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